

WHAT IS CLAIMED IS:

1. A vertical fin formed on a substrate, comprising:

5 a top surface being substantially parallel with a
horizontal surface of the substrate;

at least two opposing side surfaces being substantially
perpendicular to said horizontal surface to form the vertical
10 fin;

an outwardly sloped structure at a base portion of the
vertical fin,

15 wherein a surface of said outwardly sloped structure does
not undercut said at least two opposing surfaces of the vertical
fin.

2. The vertical fin of claim 1, wherein said outwardly
20 sloped structure is formed by a self-limiting product reaction.

3. The vertical fin of claim 1, wherein the starting
substrate is an SOI wafer.

4. The vertical fin of claim 1, wherein the substrate has one or more semiconductor layers.

5. The vertical fin of claim 3, wherein the substrate has one or more insulators proximate said one or more semiconductor layers.

6. The vertical fin of claim 3, wherein the vertical fin is formed from said one or more semiconductor layers.

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7. The vertical fin of claim 1, wherein said sloped structure has a gentle slope.

8. The vertical fin of claim 1, wherein said sloped structure is a dielectric material.

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9. The vertical fin of claim 8, wherein said dielectric material is oxide and/or nitride.

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10. A method of forming a vertical fin on a substrate comprising the steps of:

providing the substrate having one or more semiconductor layers and one or more insulators;

forming one or more vertical fins from said one or more semiconductor layers;

5 healing damage resulting from said step of forming said one or more vertical fins; and

providing a sloped base structure to said one or more vertical fins.

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11. The method of claim 10, wherein said substrate has a first semiconductor layer that underlies a buried insulator that in turn underlies a second semiconductor layer.

15 12. The method of claim 10, wherein said substrate is a single crystal SOI wafer.

13. The method of claim 10, wherein said substrate is a non-SOI wafer.

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14. The method of claim 10, further comprising the step of:

providing a hard mask film on at least one of said one or more semiconductor layers.

15. The method of claim 14, wherein said hard mask film is
5 a silicon dioxide or a silicon nitride.

16. The method of claim 14, further comprising the step
of:

10 providing a photoresist layer above said hard mask film.

17. The method of claim 16, further comprising the steps
of:

15 patterning said hard mask film as desired; and

removing said photoresist layer and/or at least one of said
one or more semiconductor layers by a suitable chemical process.

20 18. The method of claim 10, wherein said step of healing
damage is accomplished by a sacrificial oxidation and a
sacrificial oxide clean.

19. The method of claim 10, wherein said step of providing a sloped base structure to said one or more vertical fins is accomplished using a self-limiting product reaction.

5 20. The method of claim 19, wherein said sloped base structure is integral to both said one or more vertical fins and said one or more insulators.

21. The method of claim 20, wherein said sloped base
10 structure is suitable to prevent any undercutting of said one or more vertical fins.

22. A method of forming a FinFET from a substrate comprising the steps of:

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providing the substrate having one or more semiconductor layers and one or more insulators;

forming one or more vertical fins from said one or more
20 semiconductor layers; and

providing an outwardly sloped base to said one or more vertical fins via a self-limiting reaction.

23. The method of claim 22, wherein said self-limiting reaction includes HF and ammonia.

24. The method of claim 22, wherein said self-limiting
5 reaction includes HF and ammonia in combination with aqueous HF.

25. The method of claim 22, wherein said self-limiting reaction results in a reaction product layer that expands in volume, wherein said reaction product layer limits the reaction
10 at a base of said one or more vertical fins.

26. The method of claim 22, further comprising a step of removing a sacrificial oxidation, wherein said step of removing said sacrificial oxidation is done simultaneously with said step
15 of providing said outwardly sloped base to said one or more vertical fins via a self-limiting reaction.